

## **REMARKS**

By the foregoing amendment, claims 1, 2, and 5-9 have been amended, claims 3 and 4 have been canceled, and claims 10-20 have been added. The amendments to claims 1 through 9 have been made to render the claim language even more in conformance with U.S. patent practice. Newly added claims 10-19 are single dependent claims generated from original multiple dependent claims as filed initially in this application.

## **RESPONSE TO THE OFFICE ACTION**

### **Telephone Interview with Examiner**

Applicants thank the Examiner for a Telephone Interview on February 13, 2008 with Applicants' representative, Thomas Weber. During the interview, it was clarified that the objection to claim 1 as indicated on the Summary Sheet of the Office Action was in error. Thus, Applicants will disregard the objection to claim 1.

### **Formal Matters**

Applicants note with appreciation that the Office Action acknowledges the claim of priority made under 35 U.S.C. § 119 and confirms receipt of all copies of certified copies of the priority documents.

Applicants also note with appreciation that the Action includes signed and initialed copies of the Forms PTO-1449 submitted in the Information Disclosure Statements of August 16, 2006 and May 10, 2007, thereby indicating that the Examiner has considered the submitted information. Applicants note that the Information Disclosure Statement of September 12, 2006 did not include a Form PTO 1449 because no art was submitted. However, the Action

acknowledges consideration of the International Written Opinion and the International Preliminary Report on Patentability submitted in the Information Disclosure Statement of September 12, 2006.

Applicants also note with appreciation that the Action indicates acceptance of the drawings submitted on May 16, 2006.

### **Objection to the claims**

The Action indicates on the Summary Sheet that claim 1 is objected to. As noted above, in a telephone conversation with the Examiner on February 13, 2008, the Examiner stated that the indication of an objection to claim 1 was erroneous and can be disregarded.

### **Claim Rejections under 35 U.S.C. § 102(b)**

The Office Action rejects claims 1-4 and 6-7 under 35 U.S.C. § 102(b) as anticipated by WO2002/087735; as presented by U.S. Patent Application Publication No. 2004/0167237 A1 to Kim et al. The Action asserts that Kim discloses all the elements of rejected claim 1. With respect to the rejections of claims 2 and 6, the Action asserts that the recitations (d) and (e) in claim 2 and the element of claim 6 are inherent properties of the membrane disclosed in Kim and therefore anticipated.

Applicants respectfully traverse these rejections. Applicants respectfully submit that the Office Action fails to disclose:

A hollow fiber membrane for blood purification, the hollow fiber membrane having an integrally continuous structure from the inner membrane surface to the outer membrane surface and comprising a hydrophobic polymer and a hydrophilic polymer; and exhibiting a zeta potential on the inner surface thereof of greater than -3.0 mV but less than 0 mV at pH 7.5, when measured using a sample with an embedded resin on the outer side for allowing the electrolyte solution to flow

through only the inside of the hollow fiber, and using a 0.001 mol/l potassium chloride aqueous solution as an electrolyte solution. (emphasis added)

Applicants respectfully submit that Kim et al. fails at least to disclose the above recited structure as recited in independent claim 1. More specifically, Applicants submit that Kim et al. fails to disclose “exhibiting a zeta potential on the inner surface thereof of greater than -3.0 mV but less than 0 mV at pH 7.5.” The Office Action asserts that Kim et al. discloses a zeta potential in Table 1 for Comparative Experiment 1 allegedly falling into the claimed range between -3.0 mV and 0 mV. Applicants submit, however, that the zeta potential disclosed in Kim et al. is not measured in the same manner as the zeta potential as claimed. Indeed, if measured using the same technique as the present invention, Kim et al. would not exhibit a zeta potential falling within the scope of Applicants’ claims.

*Difference in the Membrane Structure*

Applicants respectfully submit that a hollow fiber membrane comprising a polysulfone-based resin and a polyvinyl pyrrolidone exhibits high performance in removing undesired substances, and has high efficiency as a blood purification membrane to reduce the absorption of protein from blood onto the membrane. In order to minimize the amount of protein absorbed onto the hollow fiber, an appropriate amount of polyvinyl pyrrolidone is required in the membrane. In Comparative Example 1, Kim et al. discloses a hollow fiber made from a raw spinning solution comprising polysulfone-based resin, polyvinyl pyrrolidone of unknown molecular weight and N-methyl-2- pyrrolidone. Applicants respectfully submit that the use of N-methyl-2-pyrrolidone will not provide for a membrane with a polyvinyl pyrrolidone concentration in the hollow fiber membrane in the range of 3.0 to 5.0 wt %. This is because N-

methyl-2-pyrrolidone is a solvent having high solubility for polysulfone-based resin and polyvinyl pyrrolidone. For example, at room temperature, the solubility of N-methyl-2-pyrrolidone against polysulfone-based resin and polyvinyl pyrrolidone is 1.5 times higher than that of dimethyl acetamide. Applicants note that using N-methyl-2-pyrrolidone as a solvent will not result in a polyvinyl pyrrolidone concentration in the hollow fiber membrane in the range of 3.0 to 5.0 wt% but a concentration that is higher. In order to achieve the desired polyvinyl pyrrolidone concentration between 3.0 and 5.0 wt%, dimethyl acetamide is a more preferable solvent.

*Difference in the Zeta Potential*

Kim et al. discloses in Table 1 that comparative example 1 has a zeta potential of the hollow fiber of -1 mV. Applicants submit that this value is obtained by a different method as compared to that used in the present application, namely a method without using having an embedded resin on the outer side in order to allow the electrolyte solution to flow through only the inside of the hollow fiber. Applicants submit that the Office has failed to advance any position that would support a conclusion that Kim et al.'s zeta potential would be the same as Applicants', when tested under the same conditions. Applicants submit that, in the absence of such showing, the Office has failed to carry its initial burden of establishing a *prima facie* case of anticipation.

Moreover, Kim et al. disclose in the abstract that the "dense layer non-charged at least on the outermost surface (i.e., the inner membrane surface) serves as a size barrier." Accordingly, the hollow fiber disclosed in Comparative Example 1 of Kim et al. differs from that of the present application, at least in that they contain charges at different places. In the present

application, at pH 7.5, which is equivalent to the pH of blood, the zeta potential of the inner membrane surface, at which contact with blood occurs, is higher than -3.0 mV and less than 0 mV. Because of this zeta potential, the presently claimed invention can provide for a hollow fiber membrane that has an enhanced phosphorus-removing performance without impairing antithrombogenicity and a blood purification apparatus using the hollow fiber membrane (see paragraph [0017]). If the zeta potential is above 0 mV, the membrane surface is positively charged and exhibits a rapid absorption of negatively charged platelets and the like, leading to a decrease in antithrombogenicity; and if the zeta potential is less than -3mV, the phosphorus-removing performance is decreased (see paragraph [0043]).

*Declaration under 37 C.F.R. 1.132*

In support of the above remarks, Applicants respectfully submit herewith a Declaration under 37 C.F.R. § 1.132. Applicants note that a hollow-fiber was prepared according to the instructions of Kim et al. and the zeta potential of this fiber was measured having an embedded resin on the outer side of the membrane. Applicants respectfully submit that under these conditions, the zeta potential of a hollow-fiber prepared according to Kim et al. is +4 mV, which lies outside of Applicants' claimed range between -3 mV and 0 mV. Therefore, Applicants respectfully submit that the hollow fiber of Kim et al. does not anticipate the presently claimed hollow fiber.

In view of the foregoing, Applicants respectfully submit that the structure of Kim et al. differs from the structure of the present invention and thus, Kim et al. fails to anticipate the present claims.

**Claim Rejections under 35 U.S.C. § 103(a)**

The Office Action raises the following obviousness rejections:

- (a) The Action rejects claim 5 under 35 U.S.C. 35 U.S.C. § 103(a) as being unpatentable over Kim in view of U.S. Patent No. 6,355,730 B1 to Kozawa et al.; and
- (b) the Action rejects claims 8 and 9 under 35 U.S.C. 35 U.S.C. § 103(a) as being unpatentable over Kim in view of RE 36,914 to Carlsen et al.

The Action asserts that the secondary references, Kozawa et al. and Carlsen et al., cure the deficiencies of Kim et al. with regard to dependent claims 5, 8, and 9. The Action asserts that Kozawa et al. cures Kim et al.'s deficiencies with respect to a hollow fiber having a polyvinyl pyrrolidone concentration in the hollow fiber membrane in the range of 3.0 to 5.0 wt % and Carlsen et al. cures the deficiencies of Kim et al. relating to a blood purification apparatus comprising a hollow fiber membrane, installed in a cylindrical container.

In view of the foregoing remarks regarding the rejections under § 102, Applicants submit that Kim et al. fails to disclose all of the elements of the presently claimed invention, including for example, the claimed zeta potential. Applicants respectfully submit that neither Kozawa et al. nor Carlsen et al. cure this deficiency. Thus, the combination of Kim et al. with either Kozawa et al. or Carlsen et al. fails to render obvious claims 5, 8, or 9.

Applicants respectfully request withdrawal of the obviousness rejections.

**CONCLUSION**

In view of the foregoing, the Examiner is respectfully requested to reconsider and withdraw the rejections of record, and allow all the pending claims.

Should there be any questions, the Examiner is invited to contact the undersigned at the below listed telephone number.

Respectfully submitted,  
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